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Science and Technology Perspectives

DEVELOPMENTS

Joint Research

(PRC) The Chinese Academy of Sciences plans to develop and share scientific research laboratories with Beijing and Qinghua Universities. The laboratories will be managed and used equally by the three institutions. A committee composed of domestic and foreign scientists and engineers will select the projects and experiments to be undertaken. Initially, the laboratories will work in the fields of biotechnology, structural chemistry, and microprocessing technology. (Beijing GUANGMING RIBAO 5 Jul 86) * STAT STAT

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FEATURE ARTICLES

REPORTS

PERSPECTIVES selections are based solely on foreign press, books and journals, or radio and television broadcasts. Some of the materials used in this publication will appear as abstracts or translations in the FBIS serial reports. Comments and queries regarding this publication may be directed to the Center Chief, to individuals at the numbers listed with items, or to the Science and Technology Center at

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DEVELOPMENTS

DEVELOPMENTS highlights worldwide S&T events in the foreign media. Items followed by an asterisk will be published by FBIS. The contributor's name and telephone number are provided.

Ariane

(France) Tests of the new igniter and complete HM-7 engine of the Ariane third stage will continue until late October. The tests are a response to 14 recommendations made by the investigating committee that studied the causes of Ariane's fourth failure. SEP's PF-41 test bench has flight simulation equipment and high-speed cameras specially designed for reconfiguring the HM-7. (Paris AGRA data base 29 Jul 86) Antwerp [redacted] STAT

Computers

(UK) Researchers at Scotland's Strathclyde University have developed prototypes of a dual port random-access memory in 6-micrometer NMOS technology. The memory is called GAM or Generic Associative Memory and contains a 64 x 64 matrix with 4,096 intersections all containing switches capable of performing elementary logical operations. The device will be marketed by Deductive Systems as soon as the 2-micrometer CMOS version is available in the fall. (Amsterdam COMPUTABLE 1 Aug 86) * Antwerp [redacted] STAT

(UK) The recently-initiated Parsifal (Parallel Simulation Facility) project, a part of Britain's Alvey program, aims at developing software to optimize connections between parallel processes. The software will be written in Occam and is designed to improve the configuration of Inmos' transputer chips involved in parallel processing. (Amsterdam COMPUTABLE 18 Jun 86) * Antwerp [redacted] STAT

(Hungary/USSR) A Soviet R-45 computer has been installed at the KFKI (Central Physics Research Institute) in Budapest. The Hungarians paid the Soviets 100 million forints (about two million dollars) for the machine. It will be used in particle and nuclear physics, atomic energy, and microelectronics R&D programs in addition to the KFKI space research program. (Budapest MAGYAR HIRLAP 18 Jul 86) [redacted] STAT

(Hungary) KFKI has developed a 32-bit superminicomputer called the TPA-11/440. The computer's compatibility with industry-standard machines makes it useful for office automation, process control, data processing, work with expert systems, and CAD/CAM applications. It will be ready for full testing with peripherals in late 1986 or early 1987. (Budapest IMPULZUS 28 Jul 86) [redacted] STAT

(PRC) The Institute of Computing Technology in Beijing recently introduced its first superminicomputer, the KJ-8920. With both a main processor and a resource management processor, the KJ-8920 can perform one floating-point operation in 200 nanoseconds. Its 16 megabyte memory can be expanded an additional 20 or 40 megabytes. (Paris LE MONDE INFORMATIQUE 16 Jun 86) * Antwerp/ STAT

Esprit, Race

(EC) Though the Esprit program has received the largest single award (2.05 billion ECU) of the proposed 1987-1992 EC research budget of 7.7 billion ECU, this represents roughly a 6 percent reduction for the second five-year phase of the program. Race's cutback will be nearly 20 percent. Participating countries are being asked to shoulder a greater share of the financing. (Paris LE MONDE 29 Jul 86 *, Amsterdam COMPUTABLE 1 Aug 86) Antwerp/ STAT

Fiat Modernization

(Italy) Between 1986 and 1988, Fiat will spend 2 trillion lire to equip certain southern Italian plants with new computer technology. The designated plants produce automobiles, aeronautics, and railroad systems. Fiat will also spend 600 billion lire on six new technical-scientific centers. Their fields of research have not yet been disclosed. (Florence LA NAZIONE 2 Aug 86) STAT STAT

Fusion Reactor

(Japan) Using a small diverter, the Japan Atomic Energy Research Institute has succeeded in confining plasma at a temperature of 16 million degrees centigrade to a density of 70 trillion particles/cm^3 for approximately 0.5 seconds—double the time without a diverter. This unprecedented accomplishment, which was achieved in the institute's JFT-2M Tokamak, is a significant step toward development of a fusion reactor. (Tokyo NIHON KEIZAI SHIMBUN 25 Jul 86) * STAT

GaAs Radar

(UK) Plessey has perfected a military radar system that is considerably reduced in size and weight and uses gallium arsenide semiconductors. It is capable of detecting low-flying aircraft and identifying large numbers of targets simultaneously. (Rome TELEINFORMATICA 2000 21-24 Mar 86) * STAT

Manufacturing Technology Transfer

(France/USSR) For the fourth time in three years, USSR's Gorky Automobile Plant has placed an order with France's Sciaky, a world leader in automatic resistance welding. The current contract involves a complete assembly line for the manufacture of truck cabins and is worth Fr 450 million. (Paris L'USINE NOUVELLE 24 Jul-7 Aug 86) Antwerp/ STAT

Medical Technology

(PRC) The Shanghai Plastic Institute has produced a new polytetrafluoroethylene plastic that can be used to graft blood vessels and damaged heart tissues. The product has been successfully used since 1982. Only one US company produces a similar product. (Shanghai CHINESE MEDICAL JOURNAL Mar 86) * STAT

Microelectronics

(Hungary) Two to three months will be required before production resumes at the Hungarian Microelectronics Enterprise, according to an official of the Ministry of Industry. Although the design and mask manufacturing facilities were left intact by the May fire, they are inoperable because of the damaged factory building. To maximize use of the surviving design and mask

manufacturing capacity, Hungary is seeking cooperative agreements with both Bloc and Western partners, hoping to design and make masks while its partners produce finished wafers. (Budapest IMPULZUS 12 Jul 86) * STAT STAT

Mir

(France/USSR) France's CNES (National Space Studies Center) announced that Jean-Loup Chretien and Michel Tognini have been chosen to participate in a French-Soviet mission aboard the Mir space station. The mission, which may take place in July 1988, could last a month and a half and include an EVA (extra-vehicular activity) involving construction of a metal framework outside the Mir. The final mission agenda will be determined in October. (Paris AGRA data base 31 Jul and Paris L'HUMANITE 1 Aug 86) * Antwerp STAT

Plastic-Body Cars

(PRC) China has produced its first plastic-body car and plans to turn out 2,000 plastic minicars (model BS 111-F) by the end of next year. Tang Jingshen, inventor of the car, melded seven types of plastics to create a compound which he claims is stronger than steel. Compared to conventional steel cars, the plastic car provides better insulation, is corrosion resistant and rustproof, withstands greater impact without damage, is energy efficient, and is simple and inexpensive to produce. (Beijing RENMIN RIBAO 5 Aug 86, BUSINESS WEEKLY section of CHINA DAILY 6 Aug 86) * STAT

R&D Budget

(France) The portion of France's 1987 R&D budget administered by the Ministry of Research includes a 5.8-percent increase over the 1986 figure of Fr 24 billion. The large R&D organizations CNRS, INRA, INSERM, and ORSTOM will receive a major share of the additional funds, while ANVAR will take a 30-percent cut. (Paris LE MONDE 3-4 Aug 86) * Antwerp STAT STAT

Robotics

(PRC) China's first robot welder, the Hua Yu No. 1, was unveiled in February at the Harbin Xinxgguang Machine Tool Plant. Developed jointly by the Harbin Institute of Technology and the Fenghua State Machine Tool Plant, the robot is 1.6 m high, weighs 750 kg, and has five degrees of freedom (waist, upper and lower arm, wrist swing, and wrist twist). It has visual, auditory, and tactile sensors, and can understand over 20 commands. (Beijing BANYUE TAN 25 May 86) STAT

Sonar

(France) Thomson Sintra is reportedly involved in several new sonar projects for use by the French Navy, including the development of fiber-optic connectors, underwater laser detectors, and signal processor chips. (Paris ELECTRONIQUE ACTUALITES 20 Jun 86) * STAT

Stealth Technology

(Italy) Citing studies carried out by Aeritalia in Turin, AIR PRESS, an Italian weekly specializing in aeronautics and space flight, reports that Italy is conducting research in Stealth technology. No further details have been reported in the press, however. (Milan IL SOLE-24 ORE 27-28 Jul 86) * STAT STAT

USSR: SPACE ORGANIZATION GLAVKOSMOS

Key Points: Recent Soviet media reports have identified members of the new national space organization Glavkosmos. An interview with a Glavkosmos official attempts to clarify the relationship between Glavkosmos and the USSR Academy of Sciences and discusses Soviet policy on commercial space launches.

In October of last year Soviet media reported the establishment of a new national space organization Glavkosmos (Main Administration for Creation and Use of Space Technology for the National Economy and Scientific Research). The first announcement of the new organization occurred at the 18th annual meeting of the national coordinating groups of the Intercosmos countries held in Moscow. The functions of Glavkosmos were stated only in general terms of serving the interests of the national economy, science, and international cooperation; its relationship with other entities such as the Academy of Sciences and the Intercosmos Council were not discussed.

The 13 October issue of IZVESTIYA carried an interview with A. I. Dunayev, identified as the head of Glavkosmos. As outlined by Dunayev, Glavkosmos would exercise broad management authority in both USSR national and international space programs. Dunayev stated that applied and scientific space programs had grown to such an extent that it had become necessary to create a "special coordinating organ." On the national level Glavkosmos would closely interact with ministries and departments and review their proposals for space research and utilization. The new organization would also have a planning function. According to Dunayev, Glavkosmos would develop long-range plans and organize comprehensive programs for development of space technology. Among its other functions, Glavkosmos would provide launch services and would receive and disseminate space data for practical applications. In the international arena, Glavkosmos would organize activities for the international space programs in which the USSR participates.

Subsequent press references to Glavkosmos did not provide any further clarification as to its functions or authority. However, the status of the new organization was indicated in March of this year when the Soviet press reported a Kremlin meeting between General Secretary Gorbachev and the scientific leaders involved in the successful Venus-Halley's Comet mission (Project Vega). The Academy of Sciences was represented by Academy president Aleksandrov and vice-president Velikhov. Three directors of the Vega project were present: research director Roald Sagdeyev (director of the Academy's Institute of Space Research), project technical director Vyacheslav Kovtunenko, and ballistics director Yuriy Mozzhorin. The only other person reported by PRAVDA as attending the Kremlin meeting was Aleksandr Dunayev.

The 22 June issue of MOSCOW NEWS published an interview with Stepan Bogodyazh, identified as chief of the International Liaison Department of Glavkosmos. The interviewer's first question points out that coordination of international space programs had previously been handled by the Academy of Sciences via the Intercosmos Council. In his response Bogodyazh asserts that the Academy of Sciences remains the leading organization determining the scientific content of the USSR national space program and the research topics for international cooperative programs. The role of Glavkosmos, according to Bogodyazh, will be in the areas of hardware and scheduling. In cooperation with manufacturers of space equipment Glavkosmos will determine the most efficient means for performing specific research tasks, i.e., what kinds of satellites or spacecraft should be used and how scheduling should be arranged. A similar explanation was offered by Roald Sagdeyev in an interview published in the 6 March issue of the French newspaper LIBERATION. Sagdeyev comments favorably on the creation of Glavkosmos as a provider of commercial space launches and states that it will also provide this service for scientific missions. According to Sagdeyev, since Glavkosmos will handle contracts with industrial suppliers it will relieve the space scientific community of this burden. However, the overall review and planning functions of Glavkosmos, as originally claimed by Dunayev, and the lines of authority between it and organs of the Academy of Sciences still remain unspecified.

Later in the MOSCOW NEWS interview Bogodyazh addresses the question of financial arrangements for space launches. In the case of cooperative programs of a scientific nature, such as the Phobos mission or the upcoming joint flights with Syrian and French cosmonauts, the USSR will continue to provide launch services and facilities without compensation. However, launches for operational systems will be on a commercial basis. Thus, India will reimburse the USSR for the launch of an earth resources satellite scheduled for 1987. The Soviet Union has provided free technical assistance and launch services for three previous Indian satellites but these are deemed to have been developmental or research programs. Bogodyazh goes on to charge that the US is exerting pressure to eliminate the Soviet Proton launcher from consideration for satellite launches by the Inmarsat organization. The Proton is one of six launch vehicles, including the US Shuttle and the Ariane, being considered by Inmarsat for launches of communications satellites beginning in 1988.

Two additional members of the Glavkosmos staff were present at a press conference carried by Moscow Television Service on 1 August. Along with cosmonauts Kizim and Solovyev and other personnel associated with manned missions, the participants included Yuriy Fedorovich Makarov, identified as the deputy head of Glavkosmos. This may be the same Yu. F. Makarov who coauthored a 1983 article on research performed by the Venera-13 and -14 space craft. The first presentation at the press conference was made by Yuriy Pavlovich Semenov, identified as the director of projects for development of manned flight apparatus for international programs of Glavkosmos. This is probably the same Yu. P. Semenov listed as a contributor to the recent book "USSR Cosmonautics" and the Doctor of Technical Sciences Yu. Semenov who coauthored a 1981 article on design features of the "Salyut-6" space station.

(Translations of the above sources have appeared or will appear in USSR REPORT: SPACE.)

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USSR: SCIENTIFIC-TECHNICAL COMPLEXES SUFFER SERIOUS START-UP PROBLEMS

Key Points: Under a 1985 joint decision by the Central Committee of the CPSU and the USSR Council of Ministers, 21 Interbranch Scientific-Technical Complexes (Mezhotraslevyye nauchno-tekhnicheskiye kompleksy, or MNTKs) have been established. They aim to shorten the gap between research and production and to nurture highly-skilled scientists and engineers. However, the MNTKs are encountering various problems, such as insufficient funding, a dual hierarchical structure, and general organizational chaos.

Late in 1985, a joint decree issued by the CPSU Central Committee and the USSR Council of Ministers created Interbranch Scientific-Technical Complexes (Mezhotraslevyye nauchno-tekhnicheskiye kompleksy, or MNTKs). To date, 21 MNTKs have been announced in the press, among them MNTKs for fiber optics, biological engineering, industrial lasers, personal computers, and oil extraction.

MNTKs are not a new idea, but a version of the industrial association (NPO), according to ARGUMENTY I FAKTY of April. They were created to shorten the gap between research and production by forming a single organization to oversee development of a critical technology from initial research to series production. The complete process, including introducing a development, modifying it, and improving its quality will be implemented by the MNTKs. The MNTKs will ensure that the equipment and technology not only conform to world standards, but surpass them. MNTKs will also afford extensive opportunities for training highly-skilled personnel in critical specialties. The MNTKs will in fact determine which specialists will be needed in the future. They will work closely with the USSR Ministry of Higher and Secondary Specialized Education, which will in turn be obliged to organize the training of students in accordance with the proposals of the MNTKs.

Boris Paton, director of the Institute of Electric Welding imeni Ye. O. Paton, described his expectation for the MNTKs in the March issue of EKONOMICHESKAYA GAZETA and KOMSOMOLSKAYA PRAVDA on 14 March. Paton sees the MNTKs as a way to streamline the process of introducing and implementing new technology. He states that currently new scientific and technological developments in the USSR are not fully exploited by potential users. According to data of the GKNT (State Committee for Science and Technology), 80 percent of new developments are introduced at only one enterprise, less than 20 percent at three or four institutes, and about 0.6 percent at five or more institutes. A significant number are not introduced anywhere. Often, new developments by Soviet scientists wander a long time in interdepartmental labyrinths" and cannot overcome artificially created barriers.

Despite all the expectations, however, the MNTKs are experiencing serious problems in several stages of their creation and development. These problems were discussed in detail in the media by individuals who participate directly in the creation and administration of certain MNTKs.

According to Paton, the key to the Electric Welding MNTK's success is supply and financing. The supply issue has been resolved: the Electric Welding MNTK will receive everything it needs from both the USSR Academy of Sciences and the Ministries. The financing question, however, remains undecided, since Paton insists that the main organization of the MNTK should have the right to finance or to halt the financing of R&D at its own discretion. Only then will it be able to set up mass production of new equipment, and decrease the production of obsolete equipment. G. A. Abilsiitov, director of the Scientific Research Center for Industrial Lasers of the USSR Academy of Sciences (NITsTLAN), the supervisory organization of the Industrial Lasers MNTK, describes a major problem facing that MNTK in an interview in IZVESTIYA on 16 May: the Industrial Lasers MNTK exists only on paper. Several integral components of the proposed MNTK, such as the branch institute that will deal with laser technological equipment, and the design bureau, have yet to be organized. Other components, tasked with producing specialized equipment for the MNTK, must be reorganized. Both the pilot production plant and the series production enterprise require further development of production capacities and

reorganization of existing capabilities. According to Abilsiitov, only the State Planning Committee (Gosplan) and the USSR State Committee for Material and Technical Supply can rectify these problems.

Dual subordination to the USSR Academy of Sciences and to a particular Ministry is another potential obstacle for MNTKs, and is one already facing the Industrial Lasers MNTK. Abilsiitov feels that this organization can succeed only if three conditions are met. First, the MNTK must be run under "one-man" management, that is, under one unified plan and not under a common plan. Second, the manpower, financial, and material resources must be calculated for the unified plan and specifically allocated to the MNTK. Third, and most crucial, the MNTKs central organization must be developed. This requires the creation and coordination of MNTK components with the capabilities and production capacity necessary to fulfill the goals of the MNTK.

K. I. Khamareyev, director of the Institute of Catalysis of the Siberian Department of the USSR Academy of Sciences, in the May 1984 EKONOMICHESKAYA GAZETA, made the following recommendations on the organization of the Catalyst MNTK. The main organization of the MNTK should have specific rights and clear financial and economic priority. It should be able to set construction limits, influence partners in case of nonfulfillment of obligations, and have financial resources for research and development. A central fund should be created, made up of deductions from the Ministries in proportion to their output, and managed by the main organization of the MNTK. Multi-skilled scientific production brigades should be created that will include scientists, designers, pilot works, and the enterprises for which the development is being prepared.

(Related articles will be published in future issues of SCIENCE AND TECHNOLOGY PERSPECTIVES. Translations or summaries of the above sources have appeared or will appear in USSR REPORT: SCIENCE AND TECHNOLOGY POLICY.)

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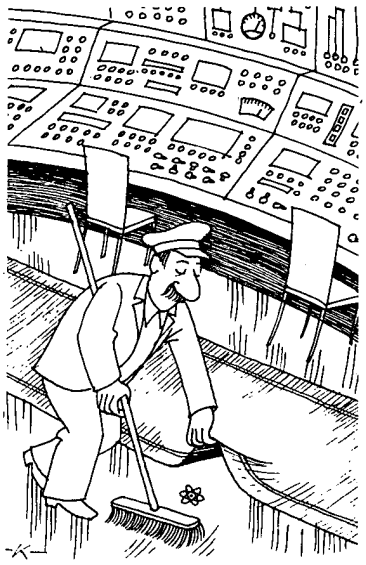
EAST BLOC: CHERNOBYL NO SETBACK TO NUCLEAR POWER PLANT CONSTRUCTION

Key Points: Candid coverage of Chernobyl in the official press of Poland and Hungary appears to have had no effect on their current plans to build nuclear power plants or on attitudes toward further nuclear power plant construction.

Polish and Hungarian media coverage of the Chernobyl nuclear plant accident appears to be thorough and candid while other Bloc countries confined themselves to reprinting news releases from Moscow. The Polish and Hungarian press coverage began as early as 28 April and even included West European reportage in Polish non-party papers and in a Hungarian Domestic Service report. The "Power Plant" cartoon from the popular Hungarian pictorial weekly UJ TUKOR of 29 June may reflect the prevailing attitude toward nuclear power. It appears to be the only cartoon relating to Chernobyl published in the East Bloc press.



"Power Plant"

Although Chernobyl coverage was more candid in Poland and Hungary, it seems to have had no influence on their ongoing nuclear power plant construction. In Poland, construction of the Zarnowiec nuclear power plant continues, although environmental protection groups have voiced concern. In Hungary, a country poor in power sources, the official press shows no evidence of even token resistance to nuclear power plant construction. In fact, the authorities spoke reassuringly about the built-in safety systems, "continuously being refined," at Hungary's first and only nuclear power plant, located at Paks. The party daily NEPSZABADSAG reported on 5 July that trial operation of the third Paks reactor is scheduled for this September; the fourth reactor is to be tested in December 1987. The paper comments that if work progresses at the present pace, "the target dates for beginning trial operation of both reactors may be moved up."

(For details of the Polish press activities over the Chernobyl nuclear disaster, see the FBIS Foreign Press Note of 2 Jun 86: "Poland: Press Behavior During Immediate Aftermath of Chernobyl Accident.")

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JAPAN: IMPLICATIONS OF SEMICONDUCTOR AGREEMENT ASSESSED

Key Points: Japanese semiconductor manufacturers appear to consider the recent Japan-US semiconductor agreement both impractical and ineffectual. At the same time, however, they think that the agreement may guarantee a greater profit margin in the future US market. The agreement could trigger a series of new production and export strategies among Japanese manufacturers. The Japanese may move more rapidly to build production facilities in the US or expand their existing ones here. They may also start or increase production in the newly industrialized countries (NICs) in Southeast Asia, and simultaneously intensify exports to the region.

The Tokyo press including NIHON KEIZAI SHIMBUN of 1 August reports that Japan and the US have reached agreement on their semiconductor trade dispute after more than a year of intensive negotiations. This dispute involved three major aspects: US allegations of Japanese dumping on the US market, US demand for price monitoring to prevent future dumping, and US demand for a larger share of the Japanese semiconductor market. Various newspapers including NIKKAN KOGYO SHIMBUN of 4 July report on the outline of the agreement as follows:

- The US will suspend antidumping investigations against eight Japanese semiconductor manufacturers in return for concessions. The US will ask for a quarterly report on the cost-accounting and export price data of those semiconductor products currently under US investigation—namely erasable programmable read-only-memory (EPROM) chips and all dynamic random access memory (DRAM) products with capacities greater than 256 kilobits. The US will advise the Japanese on a fair market price for each product.
- To prevent future dumping, the Ministry of International Trade and Industry (MITI) must serve as the policing agent for the US. MITI must collect quarterly the cost and export price data from all Japanese manufacturers exporting to the US and monitor cost and price movements of major semiconductor products except for EPROMs and DRAMs. MITI must submit the data to the US if and when there is a suspicion of dumping.
- MITI must also make efforts to increase the US share of the Japanese semiconductor market from the current 11 percent.

Japanese semiconductor manufacturers may not be able or may not wish to submit fully reliable data after a year or two. The Japanese appear to think that it is both impossible and impractical to keep track of precise cost and price movements on a wide variety of products for a sustained period of time. According to SHUKAN TOYO KEIZAI on 12 July, a major company official states that the volatile semiconductor market makes precise product accounting extremely difficult. He adds that it may be less costly to pay the US dumping tax than to maintain a staff of accountants.

The manufacturers also appear to think that they may enjoy a greater profit margin without much competition in the future US memory market. The Japanese consider that, under the agreement, the US will instruct the Japanese not to sell their products at prices lower than a determined level, thus guaranteeing their profit in the US market. They appear to think also that there are no longer any strong US competitors in the memory market. According to NIHON KEIZAI SHIMBUN on 21 June, the US semiconductor industry has virtually withdrawn from the memory market. The newspaper indicates that only Texas Instruments (TI) remains committed to the future memory market, which would include 1 megabit DRAM products. The press points out, however, that TI's Japanese subsidiary will be the manufacturing center for the product.

The Japanese appear doubtful that US semiconductor manufacturers can dramatically increase their market share in Japan. A survey published in NIHON KEIZAI SHIMBUN on 19 July shows that semiconductor manufacturers of the Southeast Asian NICs may have a greater chance of increasing their

market share in Japan than US manufacturers because of their relative cost advantages. The survey of 96 major Japanese consumers, including computer, robot, electronics, and telecommunications equipment manufacturers, indicates that US manufacturers would have a better chance in the Japanese market if they had faster delivery response, greater quality control, and lower price. In addition, the Japanese perceive that US manufacturers may not be interested in increasing their market share in Japan. A major Japanese semiconductor company official points out in SHUKAN TOYO KEIZAI on 12 July that US manufacturers have not started to mount export drives in Japan even though the yen-dollar exchange rate favors US exporters.

The Japan-US semiconductor agreement may trigger a series of new production and export strategies among Japanese manufacturers. The Japanese may be more strongly encouraged to increase production in the US. As of 31 August 1985, according to NIHON KEIZAI SHIMBUN, six major Japanese manufacturers, Hitachi, Toshiba, Fujitsu, NEC, Mitsubishi, and Oki, have production facilities in the US. The JAPAN ECONOMIC JOURNAL of 7 September 1985 and NIHON KEIZAI SHIMBUN of 10 and 23 October 1985 reported that Hitachi, Fujitsu, and Toshiba decided to postpone construction of their second US plants because of the worldwide slowdown in semiconductor demand. NIHON KEIZAI SHIMBUN of 5 July reports, however, that Hitachi has now started to build its second US plant in Texas. Fujitsu and Toshiba may soon follow suit. According to SHUKAN TOYO KEIZAI on 21 July, an NEC executive says that, while Japanese-made semiconductors were 10 percent cheaper than those made in the US, with the past year's 40 percent appreciation of the yen, US-made products are now 30 percent cheaper.

Japanese semiconductor manufacturers may also expand production in Southeast Asia and simultaneously intensify exports to the region. SHUKAN TOYO KEIZAI of 21 July reports that, because many US computer manufacturers have moved their assembly plants to these countries, the semiconductor market there has been growing rapidly. The journal says that it is currently a 200 billion-yen business and growing. According to NIHON KEIZAI SHIMBUN on 5 August, NEC, Hitachi, and Toshiba are expanding their production facilities in Singapore and Malaysia. In addition, Fujitsu plans to build a factory in Singapore this year and Matsushita Electronics is expanding its assembly plant there as well.

(Translations of the above sources have appeared or will appear in JAPAN REPORT: SCIENCE AND TECHNOLOGY.)

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REPORTS

REPORTS surveys research trends in articles and books on a particular field of science and technology. It also includes summaries and listings of articles and books which may serve as potential sources for future research. Conference proceedings will also be presented occasionally in this section.

USSR: STUDIES ON THE OPTICAL PROPERTIES OF OCEAN WATER

Several articles on the optical properties of ocean water have been published in Soviet scientific periodicals over the past year. These articles are categorized according to their focus and summarized below:

Absorption of Solar Radiation and Water Transparency

IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA (Dec 85) included "The Clearing Effect in the Thin Oceanic Surface Layer." It provided experimental data which reveal the correlation between the thickness of the cleared layer and the depth of penetration of daytime heating. These measurements were taken during the third cruise of the scientific research ship Akademik Mstislav Keldysh.

MORSKOY GIDROFIZICHESKIY ZHURNAL (Mar-Apr 86) contained "Solar Radiation Absorption by a Cold Ocean Film." This article stated that in most cases the laminar cold oceanic film can be regarded as transparent for penetrating solar radiation.

Vertical Characteristics of Ocean Optical Properties

OKEANOLOGIYA published two recent papers on this subject. The Nov-Dec 1985 issue contained "The Effects of Upwelling on the Vertical Distribution of Optical Properties and the Estimation of Vertical Velocity Using Optical Data." This paper noted that a change in the rate of upwelling of waters results in a considerable transformation of the vertical distribution of optical properties. The principal effects include: displacement of the layer of reduced transparency toward the surface and increased values of the optical characteristics in this layer and at the surface. This paper proposed that, since these effects are essentially dependent on vertical velocity, their measurement may be used as an additional, independent method to estimate the rate of upwelling.

The Jan-Feb 1986 edition of OKEANOLOGIYA contained "The Effect of Vertical Inhomogeneity of Hydrooptical Characteristics on Visibility in Ocean Water." This article concluded that the maximum variation of the visibiity range, determined by the inhomogeneity of the hydrooptical characteristics along the observation route, is insignificant. This conclusion was reached by calculating the image contrast under conditions of extreme stratification of the scattering index in a real ocean.

Ocean Zoning According to Hydrooptical Characteristics

MORSKOY GIDROFIZICHESKIY ZHURNAL (Nov-Dec 85) published "The Relationship Between Hydrooptical and Hydrological Characteristics in the Pacific Ocean North Polar Front Zone." This paper described the use of transparency profile type to divide a frontal zone into regions. It concluded that the boundaries of the frontal zone obtained through hydrological characteristics coincide with the boundaries determined through hydrooptical parameters. It stated that cruises of both scientific research ships Akademik Aleksandr Nesmeyanov and Akademik Aleksandr Vinogradov reported similar findings.

OKEANOLOGIYA (May-Jun 86) contained "An Approach to Zoning the World Ocean by Optical Characteristics." This article described in full a set of parameters for these optical properties (excluding polarization). It presented the formulas necessary for calculating these parameters according to available optical and other data.

Variability in Light Extinction Coefficient

Two articles described studies on light extinction coefficient variability, both conducted in the Amazon River area. DOKLADY AKADEMII NAUK SSSR (Vol. 284, No. 5, Oct 85) contained "The Role of River Discharge in Variability of the Spectra of the Light Extinction Coefficient in Waters of the Western Part of the Atlantic Ocean Tropical Zone." This paper stated that the runoff, carrying impurities of continental origin, of the Amazon and the Orinoco Rivers decreases the relative transparency of Atlantic Ocean waters. It also included data from the scientific research ship Akademik Kurchatov which suggested that the extinction coefficient is related to salinity.

MORSKOY GIDROFIZICHESKIY ZHURNAL (Mar-Apr 86) published "The Optical Structure of the Ocean Waters at the Amazon Test Area." This study was part of the "Razrezy" ("Cross Sections") project. It provided estimates of spatial and time variability of the light extinction index down to 400 meters, based on data from the 27th cruise of the scientific research ship Akademik Vernadskiy. It also addressed the effect of Amazon runoff on transparency.

General Research

OKEANOLOGIYA (Mar-Apr 86) contained "Mid-Scale Variability in Sea Brightness Coefficient." This article examined variations in the sea brightness coefficient caused by such factors as phytoplankton and internal waves, including some data obtained on the third cruise of the scientific research ship Vityaz. This study is said to be the first to use remote observation to examine mid-scale heterogeneities in the distribution of optical characteristics. Furthermore, it proposed that variabilities in various ocean optical characteristics, such as backscatter and absorption, are interrelated.

MORSKOY GIDROFIZICHESKIY ZHURNAL (Nov-Dec 85) published "Comprehensive Research on Primary Hydrooptical Characteristics of the World Ocean." This paper analyzed the scattering and extinction indices, scattering function, and degree of light penetration for the waters of the Atlantic, Indian, and Pacific Oceans and their seas. These data were obtained by the scientific research ship Akademik Aleksandr Nesmeyanov during its first cruise. This paper had the broadest scope of any we have described here. It noted that previous works on ocean optical characteristics usually have been too specialized and have not included sufficient measurements to permit definitive conclusions. It favored clarifying the interrelationships existing among the primary hydrooptical characteristics and attempted to contribute to this effort.

(Translations or abstracts of the above sources have appeared or will appear in USSR REPORT: EARTH SCIENCES.)

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USSR: PROPERTIES OF A SOLID-STATE PLASMA

Plasma, usually thought of as a highly ionized gas, can also have a solid-state form. The Institute of Solid-State Physics of the USSR Academy of Sciences discovered a paradox while investigating the nature of a solid-state plasma, according to SOTSIALISTICHESKAYA INDUSTRIYA of 30 July.

When the scientists lowered the temperature of a rod of bismuth to that of liquid helium, placed it in a magnetic field, and subjected it to microwave radiation, the electromagnetic radiation was strongly distorted. The amplitudes of the waves doubled at the input and quadrupled at the output. Upon reaching a certain threshhold, the distortion increased by a factor of 1,000, causing the rod to ring with an unprecedented hypersound—a frequency thousands of times greater than ultrasonic frequency. The hypersound results from the intense motion of the electrons in the rod.

The scientists compare the bubbling swirls of electrons in the solid-state plasma to the frothy white-caps on waves at sea. They are aware that there are similar nonlinear processes in thermonuclear plasma which are the major causes for its instability. Magnetic traps cannot hold the turbulent thermonuclear plasma for long and waves of charged particles splash outside the traps.

The Soviet scientists hope to discover the laws governing the processes of dispersion and interaction of waves in thermonuclear plasma by first investigating these processes in solid-state plasma, working with metals in a simple laboratory setting.

(A translation of the above article will appear in USSR REPORT: PHYSICS AND MATHEMATICS.)

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USSR: RECENT SOVIET BOOKS ON ELECTRONIC COMMUNICATION TECHNOLOGY

1. SHORTWAVE ANTENNAS

The book details progress in the theory and application of shortwave antennas during the period 1963-1983. When compared to the first edition (Svyaz'izdat, 1962), the current version contains much new material. Moreover, outdated sections have been revised to reflect recent scientific and technical advances.

Theory and design questions are considered, along with the fundamental construction and electrical parameters of antennas and their applications for radio communication and broadcasting. Information is presented on transmission (feed) lines and methods for synthesizing matching transformers. The book examines the theory and application of new variants of planar arrays, self-complementary and log periodic antennas, and omnidirectional antennas. Material is also presented on symmetrical and asymmetrical dipoles, traveling-wave antennas, and rhombic antennas. The book is intended for scientists and engineers engaged in the calculation, design, and operation of antenna systems. (Moscow "Korotkovolnovyye Antenny" by G.Z. Ayzenber, et al., in Russian 1985, 535 pp).

2. MILLIMETER AND SUBMILLIMETER-WAVE BACKWARD-WAVE TUBES

The book reviews solutions to problems faced by designers of millimeter and submillimeter-wave backward-wave tubes. It highlights the production of electro-optical beam focusing stages and of miniature delay systems. Heat dissipation in elements subjected to very high current densities is treated in detail. (Moscow "Lampy Obratnoy Volny Millimetrovogo i Submillimetrovogo Diapazonov Voln" by Ye. M. Gershenzon, et al., in Russian 1985, 135 pp).

(A translation of the text of the first book and the table of contents, annotation, and introduction to the second book will appear in USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING.)

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BELGIUM: DETAILS ON PARTICIPATION IN ESA PROJECTS

The contribution of major Belgian aerospace organizations to ESA (European Space Agency) programs is detailed in a recent special publication of Belgium's Scientific Policy Programming Service entitled LA BELGIQUE ET L'ESPACE, which summarizes Belgium's participation in ESA and details the subsystems it is providing for ESA satellite and spacecraft programs. The following lists the major Belgian aerospace organizations, the space programs for which their products are intended, and the specific products being developed.

ETCA (Technical Studies and Aerospace Construction) in Charleroi

Ariane launcher:	electric test units, automatic or controlled destruction boxes, engine test benches, launcher integration equipment, firing test stand
Spot, Meteosat:	power conversion systems
TV-SAT, TDF1:	various subsystem components
OTS, MARECS, ECS, TV-SAT, TDF1:	payload converters
Spacelab:	payload converters, development of the grid spectrometer
Hermes, Columbus:	power supply (in planning stage)
Exosat:	power conversion subsystem
Space Telescope:	payload converters
Space Telescope's Faint Object Camera:	photon detector

SABCA (Belgian Corporation for Aeronautical Construction) in Brussels

Ariane 4:	first-stage elevators, servomotors, components for the liquid strap-on boosters
Spacelab:	prime contractor for Igloo, a pressurized automatic supply module, rendezvous and docking systems (planned), battery manufacturing (planned)

Von Karmann Institute for Fluid Dynamics in Rhode-St.-Genese

Hermes:	aerodynamic testing

ELENCO in Mol

Aerospace application:	fuel cells (planned)

LOGICA in Brussels

Aerospace application:	Anthrorack software (equipment for the study of human physiology in zero gravity)

IAL Space (Astrophysics Institute of the University of Liege)

Giotto probe:	camera calibration

Antwerp

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PREVIEWS

PREVIEWS is an annotated list of selected science and technology items being translated by FBIS. The list may also contain previously published items of wide consumer interest.

LATIN AMERICA REPORTS

SPECIAL ISSUE: COMPUTERS, AUTOMATION, MACHINE TOOLS IN BRAZIL

The book, published by the Special Secretariat for Informatics, touches on the Brazilian computer industry. Some of the topics discussed under the computer industry are: market share among firms, comparisons of major firms, market analysis, work force composition, hardware and software. Factory automation and machine tool industries are also briefly discussed. (Brasilia "Panorama da Industria Nacional" in Portuguese 1985 pp 105)

RESEARCH IN CERAMIC ARMOR

Since 1978 the Brazilian Army has been developing special ceramics for use as armor plating. The article discusses some results of this R&D effort. (Rio de Janeiro REVISTA MILITAR DE CIENCIA E TECNOLOGIA Jan/Mar 1986 pp 28-33)

EXPLOSIVES R&D, PRODUCTION IN BRAZIL SURVEYED

The article surveys R&D and production of military explosives in Brazil. The Brazilian explosives industry, according to the article, is competitive with that of most other advanced countries. (Rio de Janeiro REVISTA MILITAR DE CIENCIA E TECNOLOGIA Jan/Mar 1986 pp 37-81)